

WHAT IS CLAIMED IS:

1. A vehicular traveling control apparatus,  
comprising:

5 a vehicular forward substance detecting  
section that detects a forward substance located in a  
forward direction of the vehicle:

a vehicular travel controlling section that  
performs a vehicular travel control on the basis of a  
10 relative positional relationship between the forward  
substance detected by the vehicular forward substance  
detecting section and the vehicle;

an impulse detecting section that detects such  
an impulse that a detection range of the vehicular  
15 forward substance detecting section is varied has  
been applied to the vehicular forward detecting  
section; and

a traveling control inhibiting section that  
inhibits the vehicular traveling control by means of  
20 the vehicular travel controlling section when the  
impulse detecting section detects that the impulse  
has been applied to the vehicular forward substance  
detecting section.

25 2. A vehicular traveling control apparatus as  
claimed in claim 1, further comprising a detection  
range variation informing section that informs a  
vehicular occupant of the variation in the detection  
range of the vehicular forward substance detecting  
30 section when the impulse detecting section detects  
the impulse has occurred.

3. A vehicular traveling control apparatus as  
claimed in claim 1, further comprising: a variation  
rate estimating section that estimates a variation  
rate of the detection range of the vehicular forward  
5 substance detecting section when the impulse  
detecting section detects that the impulse has been  
applied to the forward substance detecting section;  
and a vehicular traveling control modifying section  
that modifies a control method of the vehicular  
10 travel controlling section in accordance with the  
variation rate estimated by the variation rate  
estimating section.

4. A vehicular traveling control apparatus as  
15 claimed in claim 1, further comprising an  
acceleration detecting section that detects a  
vehicular acceleration of the vehicle and wherein  
the impulse detecting section detects the impulse  
using the vehicular acceleration detected by means of  
20 the acceleration detecting section.

5. A vehicular traveling control apparatus as  
claimed in claim 1, further comprising a yaw rate  
detecting section that detects a yaw rate developed  
25 on the vehicle and wherein the impulse detecting  
section detects the impulse using the yaw rate  
detected by the yaw rate detecting section.

6. A vehicular traveling control apparatus as  
30 claimed in claim 1, further comprising a vehicle  
speed detecting section that detects a vehicular  
velocity of the vehicle and wherein the impulse  
detecting section detects the impulse using a

variation rate of the vehicular velocity of the vehicle detected by the vehicle speed detecting section.

5     7.     A vehicular traveling control apparatus as claimed in claim 1, wherein the impulse detecting section detects the impulse on the basis of the relative positional relationship between the forward substance detected by the vehicular forward substance  
10     detecting section and the vehicle.

8.     A vehicular traveling control apparatus as claimed in claim 1, further comprising a collision avoidance determining section that determines whether  
15     it is possible to avoid a collision of the vehicle against the forward substance by means of a vehicular brake system and it is possible to avoid the collision of the vehicle against the forward substance by means of a driver's vehicular steering  
20     on the basis of the relative positional relationship to the forward substance detected by the vehicular forward substance determining section, a braking characteristic of the vehicle, and a steering characteristic thereof and wherein the impulse  
25     detecting section detects the impulse when a result of a determination by means of the collision avoidance determining section indicates that it is not possible to avoid the collision of the vehicle against the forward substance through the vehicular  
30     brake system nor the driver's vehicular steering.

9.     A vehicular traveling control apparatus as claimed in claim 3, wherein the vehicular traveling

control modifying section performs the vehicular traveling control only for a smaller relative positional relationship to the forward substance as the variation rate of the detection range estimated  
5 by the variation rate estimating section becomes large and also performs the vehicular travel control for a large relative positional relationship to the vehicular forward substance as the variation rate becomes small, as compared with the large variation  
10 rate.

10. A vehicular traveling control apparatus as claimed in claim 1, wherein the impulse detecting section comprises: an impulse occurrence determining  
15 section that determines whether such the impulse that the detection range of the vehicular forward substance detecting section is varied has occurred on the basis of whether a magnitude of an absolute value of an acceleration signal from a vehicular  
20 acceleration sensor is in excess of a predetermined display threshold value ( $\Delta\theta_{SET}$ ); an optical axis deviation quantity estimating section that estimates an optical axis deviation quantity ( $\Delta\theta$ ) of the vehicular forward substance detecting section with  
25 respect to the forward direction of the vehicle when the magnitude of a vehicular deceleration detected by the acceleration sensor is in excess of the predetermined display threshold value ( $\Delta\theta_{SET}$ ); and an optical axis deviation display unit that displays a  
30 state of the optical axis deviation when the optical axis deviation quantity ( $\Delta\theta$ ) is equal to or smaller than the predetermined display threshold value ( $\Delta\theta_{SET}$ ).

11. A vehicular traveling control apparatus as  
claimed in claim 10, wherein the impulse detecting  
section further comprises: a first optical axis  
deviation quantity determining section that  
5 determines whether the optical axis deviation  
quantity ( $\Delta\theta$ ) is equal to or larger than a first  
predetermined value ( $\Delta\theta_{TH2}$ ); a brake control operation  
distance setting section that sets a brake control  
operation distance ( $d_{SET}$ ) in accordance with the  
10 optical axis deviation quantity ( $\Delta\theta$ ) when the optical  
axis deviation quantity determining section  
determines that the optical axis deviation quantity  
( $\Delta\theta$ ) when the optical axis deviation quantity  
determining section determines that the optical axis  
15 deviation quantity ( $\Delta\theta$ ) is equal to or smaller than  
the first predetermined value ( $\Delta\theta_{TH2}$ ); and a second  
optical axis deviation quantity determining section  
that determines whether the optical axis deviation  
quantity ( $\Delta\theta$ ) is larger than a second predetermined  
20 value ( $\Delta\theta_{TH1}$ ) when optical axis deviation quantity  
( $\Delta\theta$ ) is equal to or smaller than the first  
predetermined value ( $\Delta\theta_{TH2}$ ).

12. A vehicular traveling control apparatus as  
25 claimed in claim 11, wherein, when the first optical  
axis deviation quantity determining section  
determines that the optical axis deviation quantity  
( $\Delta\theta$ ) is larger than the first predetermined value  
( $\Delta\theta_{TH2}$ ), a brake control inhibit flag  $F_{CA}$  is set to a  
30 logical " 1 " representing the brake control inhibit.

13. A vehicular traveling control apparatus as claimed in claim 12, wherein the vehicular traveling control inhibit section comprises a vehicular traveling control inhibit confirming section that  
5 confirms whether the brake control inhibit flag ( $F_{CA}$ ) is set to a logical " 1 " and the brake of a vehicular brake system is not operated and the vehicular traveling control inhibit section inhibits the traveling control when the vehicular traveling  
10 control inhibit confirming section confirms that the brake control inhibit flag ( $F_{CA}$ ) is set to a logical " 1 " and the brake system of the vehicle is not operated.

15 14. A vehicular traveling control apparatus as claimed in claim 13, further comprising a relative positional relationship determining section that determines whether the brake control inhibit flag ( $F_{CA}$ ) is reset to a logical " 0 " and a relative  
20 distance ( $d_r$ ) between the vehicle and the forward substance detected by the vehicular forward distance detecting section is larger than a brake control operation distance ( $d_{SET}$ ) when the vehicular traveling control inhibit confirming section confirms that the  
25 vehicular traveling control inhibit flag ( $F_{CA}$ ) is reset to the logical " 0 " and the brake system of the vehicle is operated.

15. A vehicular traveling control apparatus as  
30 claimed in claim 14, wherein an automatic braking is inhibited when the relative positional relationship determining section determines that the brake control inhibit flag ( $F_{CA}$ ) is reset to a logical " 0 " and

the relative distance ( $d_r$ ) between the vehicle and the forward substance is larger than the brake control operation distance ( $d_{SET}$ ) .

5 16. A vehicular traveling control apparatus as claimed in claim 15, further comprising a first collision avoidance enabling determining section that determines whether a collision avoidance against the forward substance by means of a braking through the  
10 brake system of the vehicle is possible on the basis of whether the relative distance ( $d_r$ ) and a relative velocity ( $D_r$ ) between the vehicle and the forward substance give a predetermined relationship when the relative positional relationship determining section  
15 determines that the brake control inhibit flag  $F_{CA}$  is set to the logical " 1 " and the relative distance ( $d_r$ ) is equal to or smaller than the brake control operation distance ( $d_{SET}$ ).

20 17. A vehicular traveling control apparatus as claimed in claim 16, further comprising a second collision avoidance enabling determining section that determines whether a collision avoidance against the forward substance by means of a vehicular driver's  
25 steering operation is possible on the basis of a vehicular lateral movement ( $Y$ ) required for avoiding the collision against the forward substance and a time ( $T_y$ ) required for the vehicle to avoid the collision by means of the vehicular driver's steering  
30 operation from the vehicular lateral movement when the relative positional relationship determining section determines that the brake control inhibit flag ( $F_{CA}$ ) is reset to the logical " 0 " and the

relative distance ( $d_r$ ) is equal to or smaller than the brake control operation distance ( $d_{SET}$ ).

18. A vehicular traveling control apparatus as  
5 claimed in claim 17, wherein the lateral movement (Y) is determined on the basis of one of magnitudes of a rightward movement required to steer the vehicle in a rightward direction to avoid the collision against the forward substance and a leftward movement  
10 required to steer the vehicle in a leftward direction to avoid the collision against the forward substance which is smaller than the other and a time it takes to steer the vehicle to avoid the collision against the forward substance by the lateral movement (Y).

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19. A vehicular traveling control apparatus, comprising:

vehicular forward substance detecting means for detecting a forward substance located in a  
20 forward direction of the vehicle:

vehicular travel controlling means for performing a vehicular travel control on the basis of a relative positional relationship between the forward substance detected by the vehicular forward  
25 substance detecting means and the vehicle;

impulse detecting means for detecting such an impulse that a detection range of the vehicular forward substance detecting means is varied has been applied to the vehicular forward detecting section;  
30 and

traveling control inhibiting means for inhibiting the vehicular traveling control by means of the vehicular travel controlling means when the



impulse detecting section detects that the impulse has been applied to the vehicular forward substance detecting means.

5 20. A vehicular traveling control method, comprising:

providing a vehicular forward substance detecting section that detects a forward substance located in a forward direction of the vehicle:

10 performing a vehicular travel control on the basis of a relative positional relationship between the forward substance detected by the vehicular forward substance detecting section and the vehicle;

detecting such an impulse that a detection  
15 range of the vehicular forward substance detecting section is varied has been applied to the vehicular forward detecting section; and

inhibiting the vehicular traveling control when detecting that the impulse has been applied to  
20 the vehicular forward substance detecting section.

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